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FORAGE CROPS for IRRIGATED LAND in SOUTHERN ALBERTA

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MAKE THE BEST USE OF FORAGE CROPS

Forage crops on irrigated land serve as a cash crop and also provide the foundation for a livestock industry. They are an ideal soil conditioner, improving both fertility and tilth. They help to control weeds and erosion and are profitable on low-lying and alkaline areas. Other cash crops benefit by being grown in rotations with forage crops.

Alfalfa, the most important crop, produces up to five tons of hay per acre. It is well suited for crop rotations and good stands may be maintained for three to eight years. It grows equally well by itself and in mixture with grasses.

To be of best quality, hay must be cut at the right stage of maturity, cured rapidly and stored to prevent weathering. The right time to cut alfalfa is when 10 per cent of the blossom appears. Grasses should be cut between time of heading and full flower.

Irrigated pastures provide the main source of feed for the dairy industry in southern Alberta and are rapidly becoming more important for beef and mutton production. The average grazing period is about 140 days, and the maximum beef production 750 pounds per acre. Rotational grazing on at least four fields increases production and facilitates irrigating, fertilizing and weed control.

Reed canary grass is particularly suitable for low-lying wet land where alkali is not a problem. Tall wheatgrass grows on land too alkaline for most other crops.

Corn is an ideal crop for silage. Grass-legume forage makes best silage when a conditioner of molasses, grain, or dried beet pulp is added.

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FORAGE CROPS FOR IRRIGATED LAND

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Forage crops are the foundation of successful farming under irrigation in Western Canada. Alfalfa, the queen of the forage crops, is the chief feed for the livestock industry and is a valuable cash crop. At the same time it is the best soil conditioner for the growing of other crops. Irrigated pastures supply most of the feed for the dairy industry, and are now used extensively for beef and mutton production. Reduced labor requirements coupled with high production allow pasture production to compete favorably with cash crops.

The economy of irrigated areas depends largely on the production of cash crops, which are usually best grown in rotation with soil-improving forage crops. Including grasses in the cropping system is the only way to restore soil fiber and so provide protection against erosion.

The recommendations in this publication are based on over 50 years of pasturing experience in irrigation farming at the Lethbridge station. Studies continue to provide new information on management, fertilizing, and cropping practices. New varieties and species are constantly tested and promoted when they show superior yield and suitability. The recommendations may therefore change as new information is obtained or improved varieties developed.

DESCRIPTIONS OF GRASSES

Smooth Bromegrass[2]

Bromegrass is one of the most widely used grasses for hay and pasture in Western Canada. It is a long-lived, hardy perennial, with an extensive creeping root system. It is highly nutritious and is palatable to all classes of stock. It does not survive continuous close cropping, but survives four to six weeks of flooding. It tolerates drought yet thrives under irrigation.

Two types of smooth brome are available: northern, commonly grown in Western Canada; and southern, from the south-central United States. Southern types are vigorous in the seedling year and are most productive in the early part of the season. They are very aggressive and tend to crowd out legumes and other species in mixtures. They produce as much forage as the northern strains but less seed. The northern type is widely recommended for Western Canada and is sold under the name *commercial brome.*

An improved, higher-yielding variety, Carlton, developed at the research station at Saskatoon, has been approved for license and seed increase is now under way.

Orchard Grass[3]

Orchard grass is the most important of our irrigated pasture grasses because of its high yield and its quick recovery after grazing. It is a long-lived, perennial,

[1] Head, Forage Crops Section.

[2] *Bromus inermis* Leyss.

[3] *Dactylis glomerata* L.

bunch-type grass that produces an open sod. It grows under a wide range of conditions but thrives best on moist soils. It withstands heat and shade and survives flooding from two to three weeks. Orchard grass does not withstand alkali conditions or poor drainage.

Until recently, the available varieties were not winter hardy. Occasionally the grass has been winterkilled throughout Western Canada, greatly reducing pasture production and leaving room for weeds. In 1959, the Lethbridge station released a new, hardy variety named Chinook, which is now recommended for southern Alberta.

Creeping Red Fescue[4]

Creeping red fescue is a fine-leaved grass that produces abundant leaves at the crown of the plant and only a few on the culm. It has extensive, fibrous creeping roots that produce a thick, close sod resistant to trampling. It is not a high-yielding grass but produces excellent late-summer and fall growth. It survives close, frequent grazings. It is hardy, persistent, long-lived, and readily rejuvenated by cultivation. It thrives under irrigation but does not survive excessive flooding for more than four to six weeks. It is not suited to alkali conditions.

The Olds strain is widely used at the present time and improvement of this strain is now underway at the Beaverlodge experimental farm.

Reed Canary Grass[5]

Reed canary grass is a coarse, long-lived, hardy perennial, adapted to a wide range of soil and climatic conditions. It prefers cool, moist, fertile soils but grows well on both wet and upland soils. It withstands long periods of flooding and grows especially well on poorly drained lands. It is tolerant to moderately alkali conditions.

Reed canary grass makes excellent growth on moist land, often growing five to six feet high (Figure 1). It has abundant broad leaves that make it a fair-quality crop for hay or grass silage. When grown with clover and properly grazed, it provides high-yielding, good-quality pasture.

Frontier, recently released by the Central Experimental Farm, Ottawa, is recommended for leafiness and high forage production.

Tall Wheatgrass[6]

Tall wheatgrass is a coarse, stemmy, vigorous grass that grows very tall under moist conditions. Despite its coarseness, it is palatable and is a useful grass for hay or silage. It is the most alkali-tolerant of the common cultivated grasses and is recommended for poorly drained land where alkali is a problem. This grass becomes established slowly and is also late in heading and maturing. It makes valuable late-summer pasture or hay.

Though tall wheatgrass has been winterkilled in southern Alberta, it is generally considered hardy enough for this area. It survives eight weeks of flooding.

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[4] *Festuca rubra* L.

[5] *Phalaris arundinacea* L.

[6] *Agropyron elongatum* (Host) Beauv.

Figure 1.—Reed canary grass flourishes on land too wet for other crops.

Timothy[7]

Timothy is a rather short-lived perennial that can be used for both hay and pasture. It produces a loose, open sod and when seeded alone does not withstand heavy grazing. It is palatable and relished by all classes of stock. Its nutritive value drops rapidly as the plant matures. Timothy withstands flooding up to eight weeks. Climax is the recommended variety.

Tall Fescue[8]

Tall fescue is a coarse, long-lived, tall-growing, perennial grass. It grows on a wide range of soil conditions but its main value stems from its tolerance to alkali and ability to withstand flooding as long as eight weeks. It yields high in pastures but is only fair in palatability. It survives most winters in southern Alberta. Alta is the recommended variety for this area.

Pubescent Wheatgrass[9]

Pubescent wheatgrass was introduced into southern Alberta recently and is promising as a hay and pasture grass under irrigation. It is a long-lived perennial that produces a medium-type sod. It has seedling vigor and is easy to establish. It is compatible with alfalfa in hay mixtures, makes early spring growth, and shows some alkali tolerance.

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[7] *Phleum pratense* L.

[8] *Festuca arundinacea* Schreb.

[9] *Agropyron trichophorum* (Link) Richt.

Redtop[10]

Redtop is a hardy, creeping-rooted, perennial grass that is rather short-lived. It survives long periods of flooding. It is easy to establish, but is not persistent in mixtures with aggressive species such as Kentucky bluegrass or creeping red fescue. Its main value is as a pasture grass under conditions that vary from dry to very wet.

DESCRIPTIONS OF LEGUMES

Alfalfa[11]

Alfalfa is the outstanding forage crop under irrigation. It is a deep-rooted, long-lived perennial, high in nutritive value, very palatable, and very high-yielding. Though it grows under a wide range of soil and climatic conditions, it thrives best on well-drained, moist soils. It survives flooding for only two to three weeks and it lacks tolerance to alkali.

Alfalfa is used mainly as a hay crop. It produces two good cuts per year; stands that are well managed and fertilized yield up to five tons of hay per acre.

It can be used alone or in mixtures with one or more grasses.

Failure of common alfalfa to endure pasturing, along with the bloat hazard, has limited its use as a pasture plant. The creeping-rooted variety, Rambler, developed at the experimental farm at Swift Current, Saskatchewan, is a superior pasture type for nonirrigated areas. At the Lethbridge research station progress has been made in the development of a creeping-rooted alfalfa resistant to bacterial wilt for use in irrigated areas.

Alfalfa stores food reserves in the roots during the early fall. Harvesting at this time interrupts this process, weakens the plants, and increases the hazard of winterkilling.

Much of the breeding work done with alfalfa has been to develop winter-hardiness and resistance to diseases and insects. The following varieties are recommended for southern Alberta:

Grimm is a high-yielding, winter-hardy variety. It is very susceptible to bacterial wilt and is not dependable for more than three years.

Ladak is equal to Grimm in yield and hardiness. It is more drought-resistant and has some resistance to bacterial wilt. It yields well for at least four years.

Vernal has very good resistance to bacterial wilt but is not dependably hardy.

Beaver is a newly released variety developed by the Lethbridge and Saskatoon research stations. It is a hardy, high-yielding variety with excellent resistance to wilt. Seed production of this variety is being rushed as quickly as possible.

White Clover[12]

White clover, or white Dutch clover, has been used in pasture mixtures since the first irrigated pastures were seeded in the early 1900's. It is a low-

[10] *Agrostis alba* L.

[11] *Medicago sativa* L. and hybrids of *M. sativa* and *M. falcata* L.

[12] *Trifolium repens* L.

growing perennial that adds palatability and nutritive value to the pasture and improves the soil fertility for other species in the mixture. At Lethbridge, a pasture mixture of orchard grass, bromegrass, and creeping red fescue produced 293 pounds of mutton per acre, but the addition of white clover to the mixture increased production to 424 pounds per acre.

During recent years commercial white Dutch clover has varied considerably in yield, winter-hardiness and competitive ability. This is probably due to the source of seed. Improvement of this very valuable clover is now under way.

Ladino clover, a type of white clover, was introduced into the United States from southern Europe in 1901. It is a larger, leafier clover than ordinary white and, under favorable conditions, outyields it. Most of the Ladino clovers tested in southern Alberta are not winter-hardy and have not been recommended. Pilgrim is the hardiest variety and is now being used in pasture mixtures.

Alsike Clover[13]

Alsike is a short-lived perennial that usually behaves as a biennial. Where it is allowed to reseed itself it persists many years. Alsike is a hardy clover suitable for inclusion in short-term pastures. It grows under unfavorable conditions, particularly on poorly drained soils, and can be used in mixtures for seeding on low, wet land. It thrives on cool, moist soil.

Sweet Clover[14]

Sweet clover is a biennial crop that is used mainly for soil improvement in short rotations. It has wide adaptation and some tolerance to alkali. It is used sparingly as a hay or pasture crop. Cumino, a white-blossomed variety developed for freedom from coumarin, is the recommended variety.

ANNUALS

Annual forage crops supplement permanent hay and pasture production and provide forage while permanent stands of forage crops are being established. Though any cereal grain is satisfactory, oats produce the highest yields and the leafiest regrowth. Sorghums and millets are not productive during cool, short growing seasons.

Oats recover well after cutting or grazing and at least three cuts can be harvested. To provide continuous pasture a two-field rotation is necessary, one field to be grazed while the other is recovering. Eagle and Victory are the recommended varieties.

CULTURAL PRACTICES

Good farming practices are needed to ensure good stands. Plan in advance for land preparation, irrigation (Figure 2), and management. Many pastures and hay stands are disappointing because some simple rules of good farming were not followed.

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[13] *Trifolium hybridum* L.

[14] *Melilotus alba* Desr. and *M. officinalis* (L.) Lam.

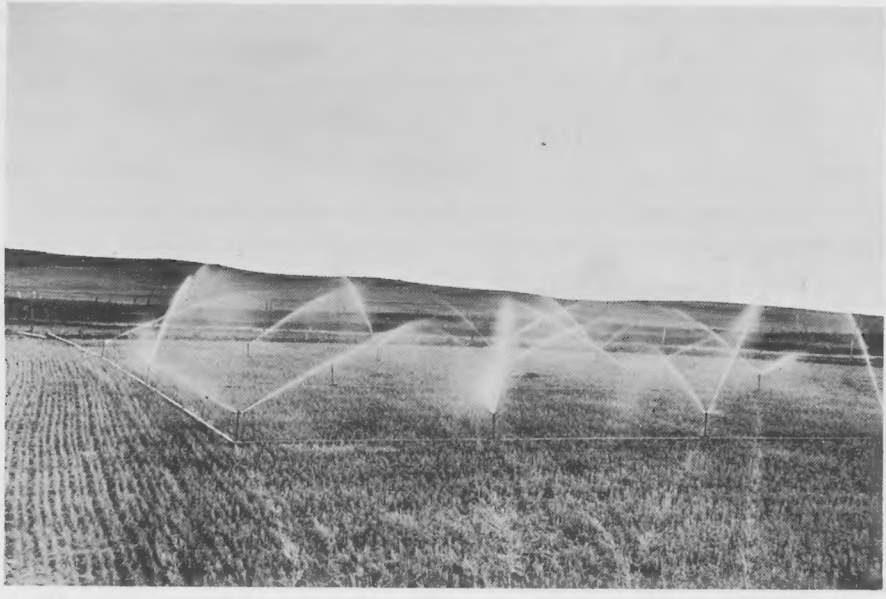

Figure 2.—Shallow-seeded forage crops are easy to establish with frequent light irrigations.

Use Top-Quality Seed

You must use top-quality seed to get good stands. Regardless of all the other efforts put into obtaining a stand the results will be disappointing if you use cheap seed. Many farmers unwittingly infest good land with weeds when they sow uncleaned or ungraded seed. Grades established under the Seeds Act limit the number of weed seeds in the various classes offered for sale in addition to guaranteeing the purity, germination and general quality.

In general, fewer weed seeds are allowed in certified seed than in seed sold as a mixture. Examine the official seed inspection report of analysis to determine the weed seeds and other impurities present in the seed sample. In this way you should be able to find and buy seed with few noxious weed seeds.

Specify the Mixture

The mixtures recommended in this publication for both pasture and hay are the result of careful experiments and observations over a number of years. Substituting other species in mixtures may or may not give the desired results. Cheap mixtures almost invariably disappoint you as they contain a high proportion of low-cost seed, most likely of inferior quality.

Preparing the Seedbed

Forage crops are readily established in well-packed summerfallow or spring-worked land, or in clean, undisturbed stubble (Figure 3). Stubble is ideal because

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Figure 3.—Undisturbed, clean grain stubble is an ideal seedbed for forage crops.

Figure 4.—Flax is a strong competitor for moisture and light and retards the establishment of grasses and legumes. Seeding without a companion crop (left) gives best results.

the soil is firm and the stubble provides shade and protection for the young seedlings. The year before seeding in stubble, level the land properly for irrigation and free it from weeds. Land cannot be levelled after the crop has been established.

Companion Crops

Companion crops, commonly called nurse crops, have been used widely for many years. Though the companion crop provides some revenue during the seeding year, the resulting forage stand is often disappointing. The forage seedlings cannot compete for light and moisture with a vigorous grain crop. Undistrubed, clean grain stubble provides protection without competition (Figure 4).

Where the seedbed is summerfallow or spring-worked land, there is a danger of soil drifting before the forage crop is established. To provide the necessary protection, use a companion crop of oats at half the normal seeding rate. Remove the oats as green feed as early as possible to lessen competition with the forage seedlings.

Rates of Seeding

The recommended rates of seeding are given in this publication for each crop or mixture. Though you may get satisfactory stands at lower rates of seeding, this is not a good way to save money. Reduced rates usually produce thin stands that are likely to become weedy and that always take longer to reach maximum production (Figure 5). If you seed too heavily, overcrowding reduces the yields.

Figure 5.—Forage mixtures must be seeded at a rate high enough to produce clean, uniform stands (right).

Time of Seeding

Either spring or fall is satisfactory for seeding most forage crops. Seed early in May so that the stand will be well established before the hot, dry summer, or in the fall between the third week of August and the middle of September.

Depth of Seeding

The best seeding depth for most forage crops is about half an inch, and only the larger-seeded grasses can be seeded slightly deeper without harmful results. Forage crop seedlings are very small and you must seed close to the surface to permit early emergence. The seedbed must be well packed or firm to prevent seeding too deep. Use a specially designed forage-crop seeder or an ordinary grain drill. Depth control flanges help maintain a uniform depth. Broadcasting does not promote conditions for uniform germination.

Inoculation of Legumes

Legumes thrive only in the presence of nitrogen-fixing bacteria. These bacteria may be absent, particularly on land being seeded to legumes for the first time. For this reason, inoculate alfalfa and clover seed before seeding. You can get commercial cultures for inoculating at most seed stores.

Fertilizers

A regular fertilizing program ensures maximum production of hay and pasture. Farm manure provides plant nutrients and adds organic matter to the soil. Manure is not a complete fertilizer and is most valuable when supplemented by commercial fertilizers, particularly phosphates. Apply 10 tons or more per acre. Well-rotted manure is generally free from viable weed seeds.

Commercial fertilizers are necessary to supply all fertility requirements (Figure 6). The kind and amount depend on the individual farm. In general, phosphate fertilizers promote growth of legumes and nitrogen fertilizers stimulate growth of grass. By careful use of both kinds you can maintain a desired grass-legume balance. The following is a general guide for top-dressing with commercial fertilizers. Each application is 100 pounds per acre.

Crop	*Kind of fertilizer*	*Time of application*
Alfalfa	Ammonium phosphate (11-48-0)	Early spring, every other year.
Alfalfa-grass mixtures	" " (16-20-0)	Early spring
Grasses alone	Ammonium nitrate (33.5-0-0)	Early spring
	" " "	After first cut and before irrigating
Pastures	Ammonium phosphate (11-48-0)	Early spring
	Ammonium nitrate (33.5-0-0)	Mid-June
	" " "	Mid-July

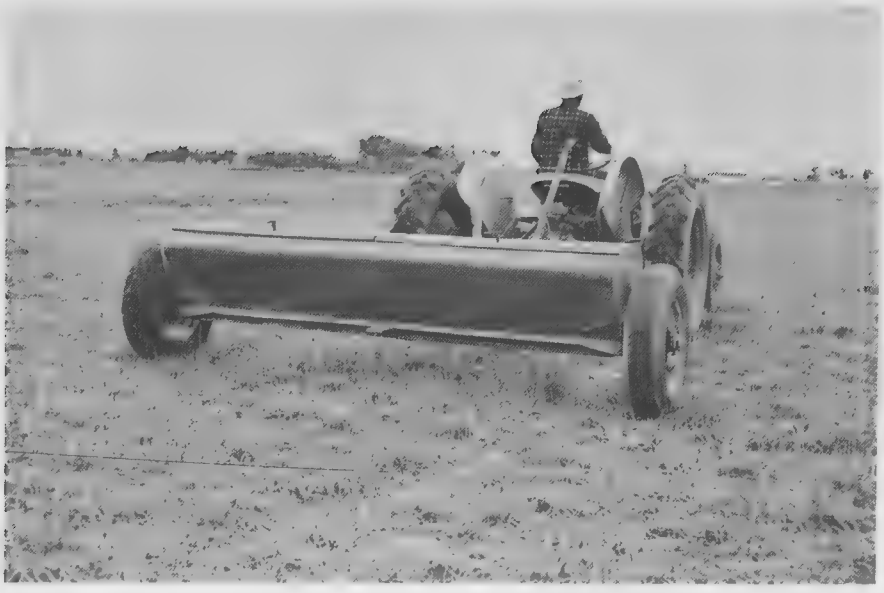

Figure 6.—Commercial fertilizers increase yields and maintain legume-grass balance.

Irrigation

Irrigated crops should never be allowed to suffer from lack of water. Apply water when the upper soil begins to dry out, before the crop begins to wilt.

Irrigate alfalfa when it is about 10 inches high and immediately after the first cut. It may need another irrigation before the second cut. Irrigate the hay field uniformly so that all the crop will be at the same stage of maturity when cut. Spotty irrigation results in patchy stands that decrease the quality of the hay.

Pastures need frequent irrigations. Preferably, irrigate every 3 to 4 weeks, or after each grazing in a rotational grazing system.

Fall irrigation usually helps all forage crops.

Properly levelled hay and pasture land can be irrigated by contour flooding. Border dykes speed the irrigation and reduce the labor required to spread the water uniformly (Figure 7). Sprinklers make possible frequent light irrigations and assist greatly in the establishment of shallow-seeded forage crops.

Weed Control

As the first step in fighting the weed problem you should use clean seed and clean land. Even so, weeds will invade or be introduced into your forage stands sooner or later. You may combat them with cultural practices and chemicals.

Clipping is a useful means of controlling weeds and preventing them from seeding in new stands or in grass-legume mixtures. Fertilizing stimulates growth and helps reduce weed competition.

Figure 7.—Proper land preparation before seeding simplifies water applications.

To control broad-leaved weeds with chemicals, follow the recommendations of your provincial department of agriculture and the directions on the herbicide label. The following information is given as a broad guide:

Crop	*Weeds*	*Chemical*	*Ounces per acre*
Grasses			
Seedlings	Annual broad-leaved	2,4-D ester	6
Established	Dandelions, perennial thistles	2,4-D ester	16
Pastures (grass-white clover)	Dandelions, perennial thistles	2,4-D ester	16
Alfalfa seedlings	Annual broad-leaved	MCPA sodium salt	4 — 6
	" " "	MCPA amine	3 — 4
	" " " and some perennial thistles	2,4-DB ester	16 — 20
Seedling clovers (except sweet clover*)	Annual broad-leaved	MCPA sodium salt	4 — 6
	" " "	MCPA amine	3 — 4
	" " " and some perennial thistles	MCPB sodium	16 — 20**

*Sweet clover is susceptible to the above herbicides and should not be treated.
**Do not use on birdsfoot trefoil.

HAY

Hay is a very important crop on irrigated land, serving both as a cash crop and as a foundation for the dairy and livestock feeding industries. Depending on quality, there is a wide range in feeding value and usefulness in hay. High-quality hay must be both highly nutritious and readily eaten by livestock.

Leafiness plays an important part in the nutritive value as most of the protein is found in the leaves. Other factors are maturity, color, freshness, and freedom from impurities. To ensure best quality you must cut at the right stage of maturity, cure rapidly, and store to prevent weather spoilage.

Time of Cutting

The time to cut forage depends on the stage of growth. With alfalfa, protein content is highest at the pre-bud stage, but drops rapidly as the plant approaches full bloom. On the other hand, dry-matter yields increase from the bud stage and reach a maximum at full bloom.

For highest yield and protein content, cut alfalfa when 10 per cent of the blossoms have opened. In general, cut grasses between the time of heading and full bloom.

Curing and Storing

Alfalfa contains 70 to 75 per cent moisture when it is cut, but only 12 per cent when air-dried. It can be safely stacked when the moisture content is 25 per cent, or baled when it is 20 per cent. Quality is lost mainly from too much handling, which causes leaves to shed. The quicker you can cut, rake, and bale it, the better the quality. Under good haying conditions in southern Alberta, you can usually do this in two days.

Grasses contain less water than alfalfa and cure quicker.

Prompt stacking and capping are necessary to preserve quality. Some producers use open hay sheds or plastic and canvas covers.

In southern Alberta, only high-protein alfalfa is artificially dehydrated for special feeds. The alfalfa is cut in the pre-bud stage, hauled directly to the dehydrator and processed into meal.

Crops for Hay

Alfalfa alone.——Alfalfa is commonly grown alone for hay. It produces two cuts per season and yields up to five tons per acre.

Alfalfa-grass mixtures.——Though alfalfa is the main individual hay crop, it is often grown in mixture with one or more grasses. The mixtures cure quicker than alfalfa alone, and the grass replaces alfalfa killed by bacterial wilt. You should use a grass that will reach the hay stage at the same time as the alfalfa.

Bromegrass is the most popular grass for growing with alfalfa because it produces a high-quality hay and usually reaches the proper hay stage at the same time as alfalfa. Bromegrass has a creeping-type root and thus spreads and replaces

any alfalfa plants lost because of disease. Mixtures of brome and alfalfa outyield alfalfa alone. For hay, the usual seeding rate of this mixture is six pounds per acre of each.

Reed canary grass is recommended for mixture with alfalfa for areas subject to unequal flooding. Alfalfa dies out under excessive flooding whereas reed canary grass is very tolerant. The mixture has proved very satisfactory under these conditions and is also good under normal moisture conditions. The seeding rate is six pounds of alfalfa and four of reed canary grass per acre.

Grass hays.——Though alfalfa-grass produces the best-quality hay, there are times when you should use grass alone. Wet land, land subject to long periods of flooding, or very alkaline land is not suitable for alfalfa. Some of this land can be used when seeded to the right grass.

Reed canary grass gives a high yield of fair-quality hay on wet land (Figure 1). Seed it in the fall or when the low-lying fields have dried up. Use eight pounds per acre.

Tall wheatgrass is more alkali-tolerant than any other of the common forage crops. It produces a fair-quality hay. In addition to being alkali-tolerant, it survives long periods of flooding. Seed it at 12 pounds per acre.

Miscellaneous hay crops.——Though sweet clover is used in irrigated areas largely as a soil-improving crop, particularly in sugar beet rotations, it is occasionally harvested as a hay crop.

Oats are also a suitable annual hay crop when cut in the dough stage.

PASTURES

Pastures were among the first irrigated crops when irrigation was introduced into southern Alberta some 50 years ago. Improved species, mixtures, and management have resulted in a safe and profitable farm enterprise (Figure 8). With the expansion of irrigation, much new land has been seeded to pasture and more is expected. Not only do the pastures give profitable returns in beef, milk, mutton, and wool, but they form a basis for a farm rotation that ensures improvement and maintenance of the soil.

Livestock production on irrigated pastures in southern Alberta is limited chiefly by the grazing period. Though growing conditions are reasonably suitable, the actual grazing period is only about 140 days. Supplemental dry-land pasture, particularly in the early spring, is the best way to extend the grazing period.

Production has varied from 250 pounds of beef per acre on nonfertilized, poorly managed pastures to 750 pounds or more on fertilized, well-managed pastures. Good pastures carry three yearling steers per acre or 10 or more ewes with lambs.

Figure 8.—Pastures can be used in the year of seeding. This one was seeded without a companion crop in April and was grazed in September.

Management

During the first season, there is often enough growth for one or two cuttings. Save these as hay or silage to allow time for a solid turf to develop before grazing. You can allow limited fall grazing if the ground is dry enough. Keep at least three inches of stubble on the stand going into the winter.

Stage of growth for grazing.—Pasture yields most when the growth reaches a height of 10 inches before being grazed. Allowing growth to get too tall before grazing reduces its palatability and nutritive value. Stop grazing while there is at least three inches of stubble left. Close grazing slows down recovery, weakens plants, and reduces yield (Figure 9).

Rotational grazing.—You get maximum production by quick removal of top growth and allowing at least three weeks for recovery before regrazing. Use a rotational system of grazing on at least four fields. The size of the fields should be such that the growth can be grazed off in about seven days (Figure 10). After each grazing, mow the pasture to remove uneaten excess growth, harrow it to break up droppings, and irrigate it. Harvest excess pasture in the spring for hay or silage.

Figure 9.—Root sloughing is caused by close clipping or overgrazing.

Mixtures

Lethbridge pasture mixture (recommended for permanent pastures for cattle or sheep).—Seed at 20 pounds per acre in the following proportions:

Bromegrass	7
Orchard grass (Chinook)	7
Creeping red fescue	4
White Dutch clover	2

NOTE: In areas where orchard grass is not hardy, substitute reed canary grass at 4 pounds per acre.

Figure 10.—Pasture rotation increases production and is made easier by an electric fence.

Temporary pasture (recommended for a quick pasture that will provide suitable production for three years).—Seed at 14 pounds per acre in the following proportions:

Bromegrass	12
Alfalfa	2

Annual pasture.—When you need pasture for one year, the best crop is:

Oats ..... 2½ - 3 bushels per acre

Wet land (recommended for areas where excess water and flooding occur).—See the section on wet land. Seed either *a* or *b* at 10 pounds per acre in the following proportions:

a) Reed canary grass	8
Alsike clover	2
b) Redtop	8
Alsike clover	2

Alkali land.—See the section on alkali land.

a) Tall wheatgrass	12 pounds per acre, or
b) Reed canary grass	8 pounds per acre, or
c) Alta fescue	12 pounds per acre.

Figure 11.—Surplus pasture is best harvested for silage or hay.

Mechanical Grazing

Mechanical grazing has aroused much interest during the last few years (Figure 11). The main advantages of this system are: increased forage production with higher yield of animal products per acre; reduced costs for fencing, water, and pest control; storage of excess forage for use at any time; safer use of legumes; use of cereal crops as supplements when forage is scarce. You must weigh these advantages against the high cost of necessary equipment and extra labor.

Bloat

Bloat occurs occasionally on pastures containing too much alfalfa or clover. When necessary you can reduce legumes with a herbicide: alfalfa with 2,4-D and clover with a brush killer. Dry roughage helps to reduce the risk of bloat. It can be hauled to the field and left in feed racks, or strips of pasture can be windrowed and left to cure before stock arrive.

FORAGE CROPS FOR FLOODED LAND

Poorly drained land or fields subject to prolonged flooding either have no vegetation or, more often, produce only weedy plants. Many grasses and legumes withstand flooding for long periods and can convert these areas to useful hay land. In flooded areas without alkali, use the following crops:

To withstand flooding for eight weeks—reed canary grass, redtop, timothy, tall wheatgrass, Alta fescue.

To withstand flooding for five weeks—bromegrass, slender wheatgrass, alsike clover.

FORAGE CROPS FOR ALKALI AREAS

Alkali is an increasing problem in the irrigation areas. As a result of poor drainage many areas gradually become so affected by alkali that normal crops can no longer grow. Though drainage is the permanent answer in such areas, the cost of tile drainage is in most cases prohibitive. A possible solution for moderate alkali conditions is to grow crops that will tolerate certain concentrations. Suitable perennial grasses are best as they remove the land from cultivation. The following crops are the most suitable: tall wheatgrass, slender wheatgrass, reed canary grass, Alta fescue, sweet clover.

FORAGE CROPS FOR SILAGE

Forage crops are not commonly used for silage, but they are being used more because the value of silage is being recognized. Bunker- or trench-type silos (Figure 12) are inexpensive and harvesting equipment has been improved. Though you can use most crops for silage, some are better suited than others. For example, ensiling makes weedy crops more palatable but not more nutritious. Losses in feed value are usually due to failure to understand the silage process.

Moisture content is important in converting crops to silage. The best water content is between 60 and 70 per cent. Most grass-legume mixtures contain too much moisture and need wilting. You can use overripe crops or crops too low in water content by adding water while filling the silo. Make every effort to maintain uniform water content.

Figure 12.—Good silage is an excellent, high-quality feed and can be made in an inexpensive horizontal silo.

Crops with a high sugar content are best suited for silage. If the sugar content is too low use a preservative or conditioner. The simplest conditioner is molasses used at 40 to 80 pounds per ton of green forage. Use dry conditioners, such as ground barley or dried beet pulp, at 75 to 125 pounds per ton. These conditioners also reduce excessive moisture.

A forage harvester with dump trucks or wagons is ideal for filling trench silos. Sharp knives improve silage quality and reduce power needs. Pack the silage constantly while filling the silo. This is best done by laying the fresh silage in thin layers and packing it with a tractor at frequent intervals.

To obtain good-quality silage, use quality crops. This requires harvesting at the right time, and generally when they have made maximum growth.

Silage can be carefully rationed or self-fed with a simple hanging rack. Three pounds of silage equals one pound of hay.

Corn

Corn is an excellent crop for silage. It contains enough sugar, has the right moisture content, is high-yielding, and is very palatable. Though corn is not dependable for the production of mature grain, some of the new hybrids reach the stage for good silage.

Grass-Legume Mixtures

Surplus pasture is best preserved as silage. Though grass-legume mixtures make silage without conditioners, the addition of molasses or barley will ensure the production of good silage. Grasses alone should be cut in the boot stage and grass-legume mixtures when the legume is in full bloom.

Alfalfa

Alfalfa makes best silage when a conditioner, either barley or molasses, is used. During poor haying weather alfalfa can be made into silage. Moisture content is readily controlled by adding grain or dry feed. Alfalfa should be cut in full bloom.

Annuals

Oats and combination crops such as peas and oats make high-quality silage. They should be cut when the grain is in the dough stage.

Miscellaneous

Pea vines from the canning industry make good silage, particularly when dry feed is added to absorb surplus water. Beet pulp is best used as it comes from the factory; dried beet pulp is an ideal conditioner for other crops.

SEED INFORMATION

Crop	Recommended varieties	Pounds per bushel	Number of seeds per pound	Seeding rate pounds per acre	
				Alone	In mixture
Alfalfa	Beaver Vernal Ladak	60	225,000	8 - 12	2 - 6
Clovers					
Alsike		60	700,000	6	2
Ladino	Pilgrim	60	800,000	4 - 6	2
White Dutch		60	700,000		2
Bromegrass	Carlton	14	136,000	10 - 12	5 - 7
Creeping red fescue	Olds	20	600,000	8 - 12	4
Orchard grass	Chinook	14 - 18	580,000	10 - 12	5 - 7
Pubescent wheatgrass		21	80,000	8 - 10	6
Redtop		14	5,000,000	6 - 8	4 - 6
Reed canary grass	Frontier	44 - 48	680,000	8 - 10	6
Sweet clover (white)	Cumino	60	260,000	10 - 12	
Tall fescue	Alta	24	220,000	8 - 10	4 - 6
Tall wheat-grass		21	78,000	8 - 12	
Timothy	Climax	45	1,200,000	6 - 8	3 - 6

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